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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/118,080	07/17/1998	WARREN M. FARNWORTH	M4065.067/P0	8629

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EXAMINER	
CHAMBLISS, ALONZO	

ART UNIT	PAPER NUMBER
2827	

DATE MAILED: 02/13/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/118,080	FARNWORTH, WARREN M.	
	Examiner	Art Unit	
	Alonzo Chambliss	2827	AU

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 November 2003*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-7,10-18 and 31-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7,10-18 and 31-33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *17 July 1998* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 11/17/03 have been fully considered but they are not persuasive for the same rationale as stated in paragraph 2 of the non-final rejection filed on 10/20/03. Furthermore, the limitations " cures to about ninety percent of its maximum strength within two to three hours without exceeding one hundred fifty degrees Fahrenheit " and " cures to about ninety percent of its maximum strength within twenty four to thirty six hours at room temperature " are claims that are limited by and defined by the process, the determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process. Therefore, the non-final rejection is maintained and this action is made **final**.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 2, 4-7, 10-14, and 16-18, insofar as being definite, are rejected under 35 U.S.C. 103(a) as being unpatentable over Heo et al. (U.S. 5,858,815) in view of the

Admitted Prior Ad (Master Bond Polymer System EP31).

With respect to Claim 1, Heo discloses a semiconductor chip 11, a single dielectric layer 20 (i.e. multi-layer film having a non-conductive film layer 21), an electrically conductive lead 26 (i.e. conductive circuit pattern) on the dielectric layer 20, and adhesive 30 (i.e. epoxy that is a electrical isolator) located between the semiconductor chip 11 and the dielectric layer 22 (see col. 5 lines 18-36', Fig. 4B). Heo fails to disclose al low temperature curing adhesive material that cures to about 90% of its maximum strength within 2 to 3 hours without exceeding 1500 F. However, the Admitted Prior Art discloses an EP31 that is a two-component room temperature (i.e. low temperature) curing epoxy that cures at 90% maximum strength developed within 2-3 hours without exceeding 1500 F. Heo and the Admitted Prior Art both disclose substantially the same environment of an epoxy as an adhesive in structural bonding applications. Also, one skilled in the art would readily recognize that the EP31 composition would avoid misalignment between the tape and integrated circuit, since the EP31 has a high peel strength and good adhesion to a variety of materials including metals, plastics, rubbers, ceramics, and glass in structural bonding applications that would prevent movement between the tape and the integrated circuit. Therefore, one skilled in the art would have readily recognized substituting the EP31 epoxy for the epoxy taught by Heo, since the EP31 epoxy has a high peel strength and good adhesion to a variety of materials including metals, plastics, rubbers, ceramics, and glass in structural bonding applications and a superb electrical insulator as taught by the Admitted Prior Art (Master Bond Polymer System EP31).

With respect to Claim 2, Heo discloses the dielectric layer 20 (i.e. multi-layer film) including polyimide, since the multi-layer film consist of non-conductive film 21 made of polyimide (see lines 4 col. 45-48 and col. 5 lines 10-17).

With respect to Claim 4, Heo discloses bond wires 40 connecting the semiconductor chip 11 to the electrically conductive leads 26 (see col. 5 lines 5060; Figs. 2A, 4B, 5B).

With respect to Claim 5, Heo discloses a resin material 50 (i.e. epoxy which is a resin material) encapsulating the bond wires 40 (see col. 6 lines 55-63).

With respect to Claim 6, Heo discloses an opening 23 defined in the dielectric layer 20, wherein bond wires 40 and the resin material 50 are located in the opening (see col. 5 lines 18-24 and col. 6 lines 55-63', Figs. 6B, 7A, 7B, ZC, 8A).

With respect to Claim 7, Heo discloses a ball grid array 60 (i.e. a plurality of solder balls arranged in an array) on the leads 26 (see col. 5 Sine 30-36;Fig. 2B).

With respect to Claim 10, Heo discloses integrated circuits formed in a semiconductor material (i.e. semiconductor chip 11), a tape 21, 22 have openings 23 aligned with the integrated circuits that is connected to bond pads 12, wherein the tape 21, 22 includes a single layer 21 and electrically conductive leads 26 (i.e. conductive circuit patterns). The leads 26 are being printed (i.e. patterned) on the single dielectric layer 21. Bond wires 40 extend through the openings, wherein bond wires 40 are electrically connected to the integrated circuits (see col. 4 lines 35-67 and col. 5 lines 10-17; Fig. 2A, 2B, 4B, 5B). The adhesive material 30 is between the tape 21, 22 and the integrated circuits (see col. 5 lines 18-24;Figs. 2A, 4B, 5B). Heo fails to disclose an

adhesive that cures to about 90% of its maximum strength within 24 to 36 hours at room temperature. However, the Admitted Prior Ad discloses an EP31 that is a component room temperature curing epoxy that cures to about 90% of its maximum strength within 24 to 36 hours at room temperature. One skilled in the art would readily recognize that the EP31 composition would avoid misalignment between the tape and integrated circuit, since the EP31 has a high peel strength and good adhesion to a variety of materials including metals, plastics, rubbers, ceramics, and glass in structural bonding applications that would prevent movement between the tape and the integrated circuit. Heo and the Admitted Prior Ad both disclose substantially the same environment of an epoxy as an adhesive in structural bonding applications. Therefore. one skilled in the art would have readily recognized substituting the EP31 epoxy for the epoxy taught by Heo, since the EP31 epoxy has a high peel strength and good adhesion to a variety of materials including metals, plastics, rubbers, ceramics, and glass in structural bonding applications and a superb electrical insulator as taught by the Admitted Prior Ad (Master Bond Polymer System EP31).

With respect to Claim 11, Heo discloses a glob top encapsulant 50 (i.e. epoxy which forms a glob of material on top of bond wires 40) in the openings 23 (see col. 5 lines 55-62 and col. 6 lines 55-63, Figs. 6B, 7A, 7B. 7C, 8A).

With respect to Claim 12, Heo discloses a ball grid array 60 (i.e. a plurality of solder balls arranged in an array) for each of the integrated circuits, wherein the ball grid arrays are located on the electrically conductive leads 26 (see col. 5 line 3O-36-Fig. 26).

With respect to Claim 13, Heo discloses a single dielectric layer 20 (i.e. multilayer

film that includes a non-conductive film 21) having openings 23 with electrically conductive leads 26 (i.e. circuit patterns) associated with the openings 23, wherein the leads are being printed (i.e. patterned) on the dielectric layer 20 (see col. 4 lines 58-67 and col. 5 lines 45-67; Figs. 4B and 5B). The curing adhesive material 30 is located between a semiconductor chip 11 and the dielectric layer 20. Heo fails to disclose a low temperature curing adhesive material that cures to about 90% of its maximum strength within 2 to 3 hours without exceeding 1500 F. However, the Admitted Prior Art discloses an EP31 that is a two-component room temperature (i.e. low temperature) curing epoxy that cures at 90 ^{0}C maximum strength developed within 2-3 hours without exceeding 1500 F. One skilled in the art would readily recognize that the EP31 composition would avoid misalignment between the tape and integrated circuit, since the EP31 has a high peel strength and good adhesion to a variety of materials including metals, plastics, rubbers, ceramics, and glass in structural bonding applications that would prevent movement between the tape and the integrated circuit. Heo and the Admitted Prior Art both disclose substantially the same environment of an epoxy as an adhesive in structural bonding applications. Therefore, one skilled in the art would have readily recognized substituting the EP31 epoxy for the epoxy taught by Heo, since the EP31 epoxy has a high peel strength and good adhesion to a variety of materials including metals, plastics, rubbers, ceramics, and glass in structural bonding applications and a superb electrical insulator as taught by the Admitted Prior Art (Master Bond Polymer System EP31).

With respect to Claim 14, Heo discloses the dielectric layer 20 (i.e. multi-layer

film) includes polyimide, since the multi-layer film consist of non-conductive film made of polyimide (see lines 4 col. 45-48 and col. 5 lines 10-17).

With respect to Claim 16, Heo discloses the dielectric layer 20 (i.e. multi-layer film) includes a metal alloy (i.e. circuit pattern 26 made of a copper foil) and a non-conductive film 21 made of polyimide (see col. 5 lines 10-17).

With respect to Claim 17, Heo discloses openings 23 that are slot-shaped to expose aligned bond pad 12 (see col. Figs. 4A, 4B, 5A. 5B).

With respect to Claim 18, Heo discloses openings 23 in the dielectric layer 20 (see col. 5 lines 48-55;Figs. 4B, 5B). The punched through feature in the claim is inherent in the reference, since any perforation in the dielectric layer 21 is equivalent to drilling or punching.

4. Claims 3 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heo et al. (U.S. 5,858,815) and the Admitted Prior Art (Master Bond Polymer System EP31) as applied to claims 1 and 13 above, and further in view of Chang et al, (U.S. 5,559,055).

With respect to Claims 3 and 15, Heo discloses a dielectric layer 20 (i.e. multi-layer film) including a non-conductive film 21 made of polyimide (see col. 5 lines 18-22). Heo-Admitted Prior Ad both fail discloses a dielectric layer (i.e. insulating film) including a benzocylobutene. However, Chang discloses a dielectric layer including a benzocylobutene having the same dielectric constant as polyimide. Also, benzocylobutene is selected from the same group of dielectric materials as polyimide

(see col. 4 lines 55-67, col. 6 lines 66 and 67, and col. 7 lines 1-3). Thus, benzocylobutene and polyimide behave in the same way in substantially the same environment, since benzocylobutene and polyimide are both low K dielectric materials, which provide protection for metal circuit patterns in semiconductor devices. Therefore, one skilled in the ad would have readily recognize that benzocylobutene and polyimide are interchangeable, since benzocylobutene and polyimide are both low K dielectric material that provide protection for metal circuit patterns in semiconductor devices as taught by Chang.

5. Claims 31-33 are rejected under 35 U.S.C. 1O3(a) as being unpatentable over Heo et al. (U.S. 5,858,815) in view of Akagawa (U.S. 6,121,688).

With respect to Claim 31, Heo discloses a semiconductor chip 11, a single dielectric layer 21 (i.e. non-conductive film), an electrically conductive leads 26 (i.e. conductive circuit patterns) on the single dielectric layer 21 , and adhesive material 30 (i.e. polyimide) located between the single dielectric layer 21 and the semiconductor chip 11 (see col. 5 lines 10-24*, Figs. 2A, 4B, 513). Heo fails to explicitly disclose an anisotropically conductive adhesive material. However, Akagawa discloses an anisotropically conductive adhesive material, a polyimide sheet, epoxy sheet used as an insulation film (i.e. non-conductive film) on a circuit pattern 62 (see col. 11 lines 45-57). Thus, the anisotropically conductive adhesive material and polyimide adhesive material behave in the same way in substantially the same environment, since anisotropically conductive adhesive and polyimide adhesive both function as bonding material for a semiconductor device. Furthermore, the anisotropically conductive adhesive functions

as an electrical material, which provides an additional source of electrical connection for the semiconductor device. Also, one skilled in the art would readily recognize that the EP31 composition would avoid misalignment between the tape and integrated circuit, since the EP31 has a high peel strength and good adhesion to a variety of materials including metals, plastics, rubbers, ceramics, and glass in structural bonding applications that would prevent movement between the tape and the integrated circuit. Therefore, one skilled in the art would readily recognize substituting anisotropically conductive adhesive for polyimide material of Heo, since anisotropically conductive adhesive would provide reliable bonding material for a semiconductor device and serve as an additional source of electrical connection for the semiconductor device.

With respect to Claim 32, Heo discloses via holes 23 (i.e. openings) defined in the single dielectric layer 21 and metal 40 (i.e. metal bond wires that provide electrical signals to the leads 26) located in the via holes 23, wherein the metal 40 is connected to the leads 26 (see col. 5 lines 10-36; Figs. 4A, 4B, and 5B).

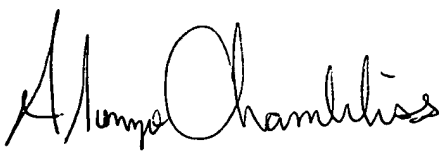
With respect to Claim 33, Heo discloses a ball grid array 60 (i.e. a plurality of solder balls arranged in an array) on the leads 26, wherein the ball grid array 60 is located within the periphery of the chip 11 (see col. 5 line 30-36;Figs. 2B, 7B, 7C).

The prior art made of record and not relied upon is cited primarily to show the process of the instant invention.

Conclusion

6. Any inquiry concerning the communication or earlier communications from the examiner should be directed to Alonzo Chambliss whose telephone number is (703) 306-9143. The fax phone number for this Group is (703) 308-7722 or 7724.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-7956



Alonzo Chambliss
Patent Examiner
Art Unit 2827

AC/February 9, 2004